Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims **1-24** (canceled).

25. (new) An ICP source for producing a high-density inductively coupled plasma in a vacuum chamber for the plasma processing of a semiconductor wafer therein, the source comprising:

a dielectric chamber wall having a vacuum side and an atmospheric side and formed of at least one section of dielectric material;

a peripheral ionization source including an RF antenna on the atmospheric side of the dielectric chamber wall and a shield on the vacuum side of the dielectric chamber wall;

the peripheral ionization source having a segmented configuration of alternating high-radiation and low-radiation segments arranged in a ring and positioned to couple power through the dielectric chamber wall into the chamber to produce a plasma having an annular, alternating, high and low power distribution;

the shield having alternating high-transparency and low-transparency sections arranged in a ring and positioned relative to the antenna to facilitate the coupling of RF energy from the antenna through the dielectric chamber wall and the shield and into the chamber in the annular, alternating, high and low power distribution, the high-radiation segments including the high-transparency sections of the shield and the low-radiation segments including the low-transparency sections of the shield; and

the high-transparency sections of the shield each having a plurality of slots therethrough oriented relative to the antenna to facilitate the inductive coupling through the high-transparency sections, and the low-transparency sections of the shield being electrically conductive substantially more solid than the high-transparency sections to impede inductive coupling through the low-transparency sections.

26. (new) The ICP source of claim **25** wherein:

the antenna has a segmented configuration that includes high-efficiency sections that provide concentrated antenna current paths close to the dielectric chamber wall and low-efficiency sections that provide distributed antenna current paths, whereby stronger magnetic fields are produced adjacent the high-efficiency sections of the conductor than adjacent the low-efficiency sections of the conductor; and

the high-efficiency sections of the antenna are aligned with the high-transparency sections of the shield to form the high-radiation segments of the peripheral ionization source and the low-efficiency sections of the antenna are aligned with the low-transparency sections of the shield and form the low-radiation segments of the peripheral ionization source.

27. (new) The ICP source of claim **26** wherein the segmented configuration of the antenna includes:

a plurality of spatially concentrated conductor portions parallel to the dielectric chamber wall and perpendicular to the slots and aligned with the high-transparency sections of the shield, and

a plurality of spatially distributed conductor portions aligned with the low-transparency sections of the shield.

28. (new) The ICP source of claim **27** wherein:

at least some of the spatially distributed conductor portions are positioned to capacitively couple energy around the shield and into the chamber for plasma ignition.

29. (new) The ICP source of claim **27** wherein:

the antenna has a segmented configuration and includes a plurality of spatially concentrated conductor segments thereof parallel to the dielectric chamber wall and perpendicular to the slots and aligned with the high-transparency sections of the shield, and a plurality of spatially distributed conductor segments aligned with the low-transparency sections of the shield.

30. (new) The ICP source of claim **26** wherein:

the dielectric chamber wall includes a plurality of discrete pieces of dielectric material, one within each of the high-radiation segments of the peripheral ionization source between and aligned with a high-efficiency section of the antenna and a high-transparency section of the shield.

31. (new) The ICP source of claim **25** wherein:

the shield is flat and circular, the high-transparency sections of the shield have a plurality of radially extending slots therethrough, and the low-transparency sections of the shield are solid.

32. (new) An iPVD apparatus having the source of claim **30**.

33. (new) The ICP source of claim **25** wherein:

the shield is generally cylindrical, and the high-transparency sections thereof have a plurality of axially extending slots therethrough.

34. (new) A plasma etch apparatus having the ICP source of claim **32**.

35. (new) An iPVD apparatus having the ICP source of claim **25**.

36. (new) A plasma etch apparatus having the ICP source of claim **25**.

37. (new) The ICP source of claim **25** wherein:

the antenna has a configuration segmented in such a way to lower its total inductance, the configuration being formed of at least one conductor having a plurality of windings each having alternating high-efficiency and low-efficiency sections each respectively aligned with the alternating high-efficiency and low efficiency sections of an adjacent winding and the alternating high-transpareney and low-transparency sections of the shield to respectively produce the alternating high-radiation and low-radiation segments of the peripheral ionization source;

the alternating segments of the peripheral ionization source being arranged in a ring and positioned to couple power through the dielectric chamber wall and into the chamber in the annular alternating high and low power distribution.

38. (new) The ICP source of claim **36** wherein:

the high-efficiency sections of the antenna provide concentrated antenna current paths close to the dielectric chamber wall and the low-efficiency sections provide distributed antenna current paths.

39. (new) The ICP source of claim **26** wherein:

the high-efficiency sections of the antenna are formed of small cross-section conductor portions close to the dielectric chamber wall and the low-efficiency sections of the antenna are formed of relatively large cross-section conductor portions.

40. (new) The ICP source of claim **25** wherein:

the dielectric chamber wall includes a plurality of discrete pieces of dielectric material, one within each of the high-radiation segments of the peripheral ionization source.

41. (new) A semiconductor wafer processing apparatus having the source of claim **25**.